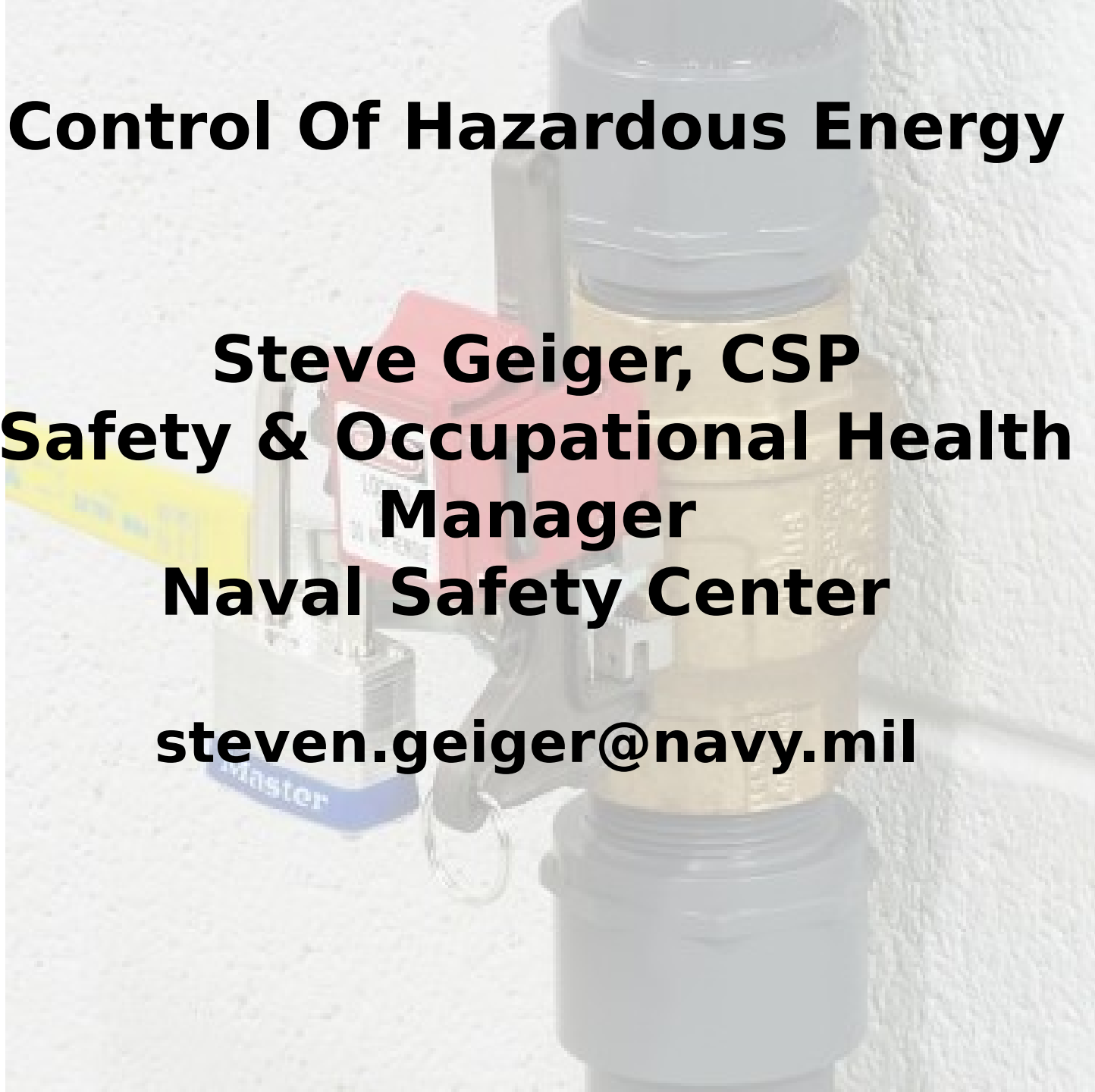


# **Control Of Hazardous Energy**

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# Objectives

- In this course, we will cover the following:
  - The need for energy control procedures
  - Methods of lockout / tagout
  - Employer's responsibilities
  - Employee training needs
  - Inspection requirements



# Most Cited OSHA Violations of 2011

1. Fall Protection (29 CFR 1926.501)
2. Scaffolding (29 CFR 1926.451)
3. Hazard Communication (29 CFR 1910.1200)
4. Respiratory Protection (1910.134)
5. Control of Hazardous Energy - Lockout/Tagout (1910.147)
6. Electrical - Wiring Methods (29 CFR 1910.305)
7. Powered Industrial Trucks (29 CFR 1910.178)
8. Ladders (1926.1053)
9. Electrical - General (29 CFR 1910.303)
10. Machine Guarding - General Requirement (29 CFR 1910.212)

# Lockout Statistics

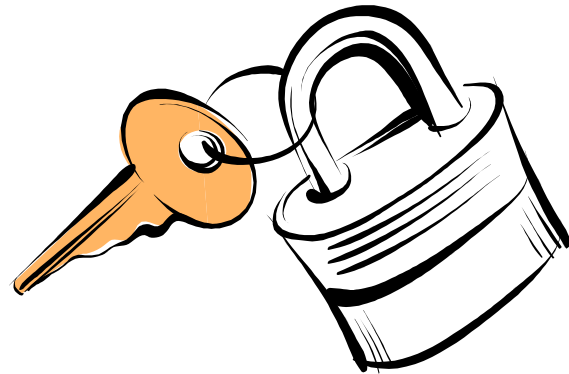
- In a study conducted by the United Auto Workers, 20% of the fatalities (83 of 414) that occurred among their members between 1973 and 1995 were attributed to lockout/tagout
- The energy sources involved in these fatalities included kinetic, potential, electrical, and thermal energy
- 20% - standard guide for % of fatalities that are attributed to lockout

# Compliance

- OSHA estimates that nearly 120 fatalities and 50,000 injuries are prevented each year by complying with LOTO standards.

# Lockout / Tagout

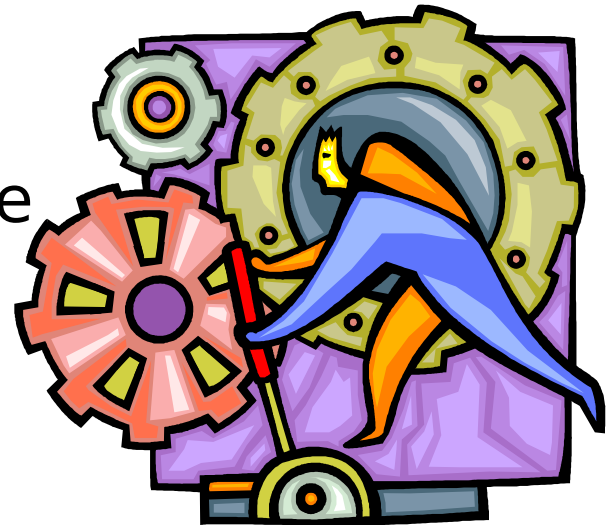
- Technically known as the **Control of Hazardous Energy**
  - Control of energizing, starting, or stored energy in machinery or equipment which could cause injury to employees



**29 CFR 1910.147**

# Scope

- Covers the ***servicing*** and/or ***maintenance*** of machines where the unexpected start-up or release of stored energy could cause injury
  - Construction
  - Installation and set-up
  - Adjustment or maintenance
  - Inspection
  - Modification
  - Routine service



**1910.147(a)(1)**

# Scope

- Exception
  - Minor tool changes and adjustments, ***and*** other minor servicing activities which take place during normal production operations, are ***not covered*** if they are:
  - Routine,
  - Repetitive, ***and***
  - Integral

....to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection.

**1910.147(a)(2)**



# Purpose

- ❑ To protect workers from the release of hazardous energy, and;
- ❑ To guard against the accidental start-up of equipment during service and maintenance.

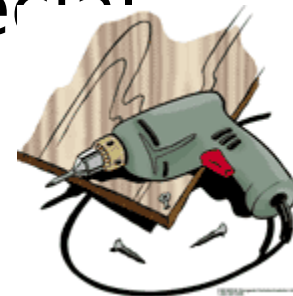
# **Does Not Cover**

- Construction, agriculture, maritime
- Installations under exclusive control of the electric utilities for power generation, transmission and distribution
- Exposure to electrical hazards from work on, near, or with conductors or equipment in electric utilization installations
- Oil and gas drilling and servicing

**1910.147(a)(1)**

# Does Not Cover

- Normal production operations
- Work on cord and plug connected equipment where plug is under exclusive control of employee performing servicing/maintenance
- Hot tap operations, under special conditions



**1910.147(a)(2)**

# Exceptions

- Work on cord & plug equipment **IF** it is unplugged, the plug remains within arms reach during servicing and authorized employee has exclusive control of the plug.

- If guards aren't removed or bypassed & are effective in preventing worker exposure to hazards created by the unexpected energization or start up of machines or equipment, or the release of energy.



# Definitions of Terms You Will Likely Hear :

**Energy Source**: Any Source of Electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gas, water, steam, air or gravity.

**Isolating Device**: A mechanical Device That Physically Prevents The Transmission or Release of Energy.

Examples: disconnect switches, slide gates, valves, blocks, and blind flanges.

# Definitions

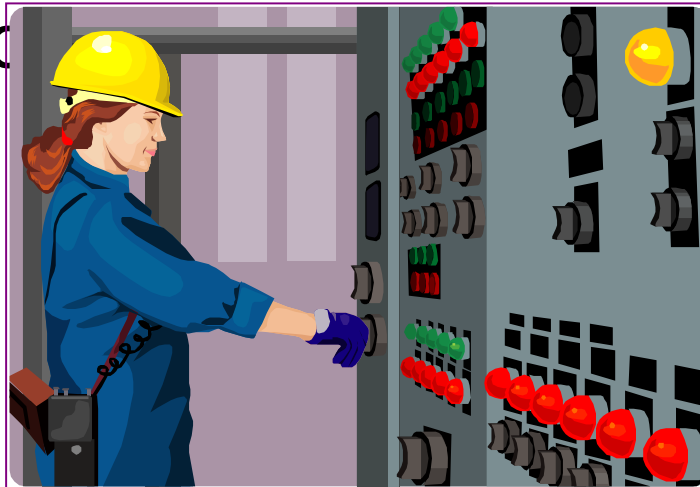
- **Authorized employee**
  - An employee who locks out or tags out machines or equipment to performs servicing or maintenance on that machine or equipment.
  - Lockout or tagout is used by these employees for their own protection.

**1910.147(b)**



# Definitions

- **Affected employee**
  - An employee who performs the duties of his or her job on equipment or in an area in which the energy control procedure is implemented and servicing or maintenance operations are performed



**1910.147(b)**

# Definitions

- **All other employees**
  - Other employees whose work operations are, or may be, in area where energy control procedures may be utilized



**1910.147(c)**  
**(7)**



# Energy Control Procedure

## Energy control (LOTO) procedure

- Statement of intended use of procedure
- Steps for shutting down, isolating, blocking and securing machines or equipment to control hazardous energy
- Steps for the placement, removal and transfer of lockout devices or tagout devices and the responsibility for them, ***and***
- Requirements for testing machine/equipment to determine and verify effectiveness of LOTO devices and other energy control measures

**1910.147(c)(4)**

# **Energy Control Procedure**

## **Exceptions for documentation:**

- Machine/equipment has no potential for stored/residual energy after shut down
- Machine/equipment has a single energy source which can be readily identified and isolated
- The isolation and locking out of energy source will completely deenergize/deactivate the machine/equipment
- Machine/equipment is isolated from that energy source and locked out during servicing or maintenance

**1910.147(c)(4)**

# Energy Control Procedure

## Documentation exceptions cont:

- Single lockout device will achieve a locker-out condition.
- Lockout device is under the exclusive control of the authorized employee performing the servicing or maintenance.
- Servicing/maintenance does not create hazards for other employees; **and**
- Employer has had no accidents involving the unexpected activation/reenergization of the machine/equipment during servicing/maintenance.

**1910.147(c)(4)**

# Why Comply? Common Excuses

- It (safety) slows down production.
- It will take longer to LOTO than it will to make the repair or clear the jam.
- We have skilled tradesmen with 30+ years experience, that's sufficient.
- We hire contractors to do the dangerous stuff.
- The e-stop is pushed, don't need to LOTO.

# Energy Sources

- ❑ Typical sources of energy that may need to be isolated, locked and tagged out include:
  - Electrical (electric motors, batteries)
  - Hydraulic (e.g. pressurized fluids in hoses/pipes)
  - Pneumatic (e.g. pressurized air in hoses/pipes)
  - Mechanical (e.g. gravity systems, or spring energy)
  - Chemical (e.g. storage vessels or pipelines containing toxic/hazardous chemicals and hydrocarbon/petrol products)
  - Thermal (e.g. hot oil lines used to heat heavy fuel oil tanks/pipe work)
  - Pressurized Liquids/Gases (e.g. hydrocarbons/petrol, steam)

**NOTE: LO/TO applies to more than just electrical circuits!**

# Energy Control Program

The employer shall establish a program consisting of:

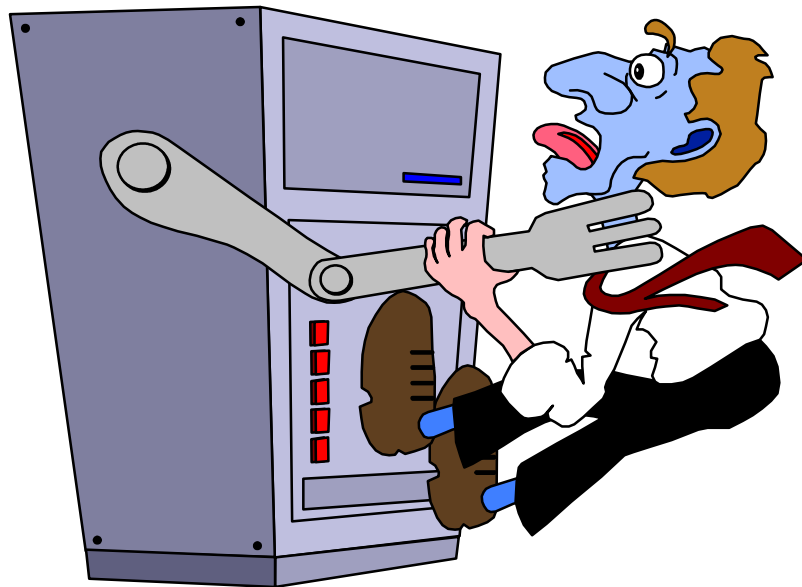
- Written energy control procedures
- Employee training
- Periodic inspections



**1910.147(c)(1)**

# Energy Control Program

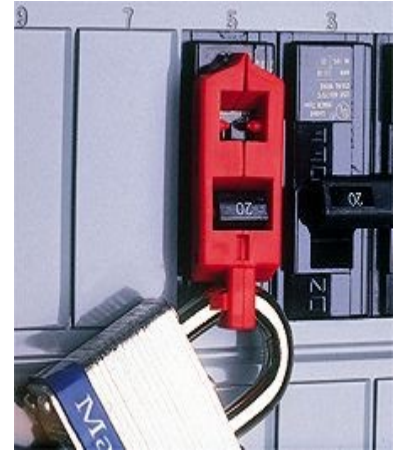
If an energy isolating device is not capable of being locked out, the employer's energy control program shall utilize a tagout system.



**1910.147(c)(2)**

# Basic LOTO Requirements

- ❑ LOTO is used to ensure equipment to be worked on can not be activated by locking out and tagging the equipment's power source.
- For Electrical powered equipment its electrical breaker is to be opened, locked and tagged.
- Steam Turbine Drivers, etc shall have their steam inlet and outlet valves blocked and locks and tags installed.



**Note: The removal of a valve handle/electrical fuse, etc. does not constitute a proper lock out.**



# Basic LO/TO Requirements (cont'd)

- ❑ Lock Out and Tag Out should both be never use a tag alone
- ❑ Test the equipment to ensure zero state
- ❑ A six hole hasp shall be installed at the equipments primary isolation point
  - The primary isolation point is to be listed 1<sup>st</sup> on the Equipment Isolation Point. Example: (Circuit Breaker of electrical motors)
- ❑ If an isolation point cannot be locked out another isolation point further back in the system should be identified and LOTO performed there.
- ❑ Only the maintenance person who fitted a lock and tag is authorized to remove it



# Energy Control Program

- When a tagout device is used on an energy isolating device which is capable of being locked out
  - Tagout device shall be attached at the same location
  - Must provide



**1910.147(c)  
(3)**

# Materials and Hardware

- Provided by employer
- Singularly identified
- Only device(s) used
- Not used for other purposes



**1910.147(c)(5)**

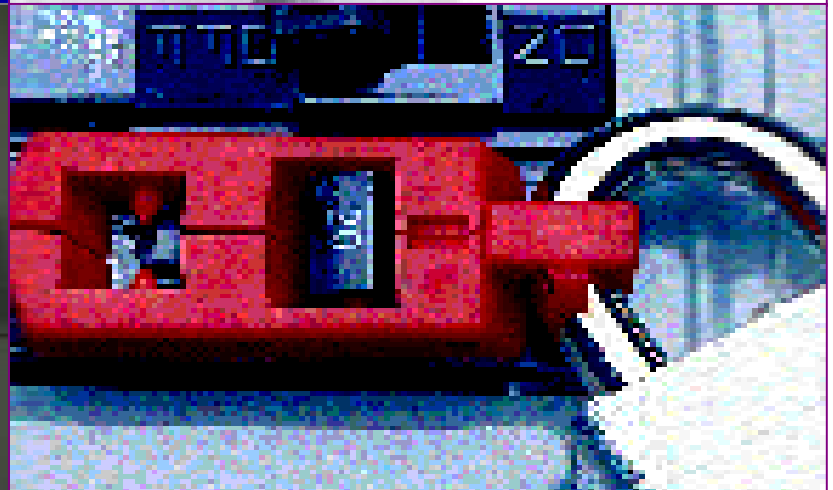
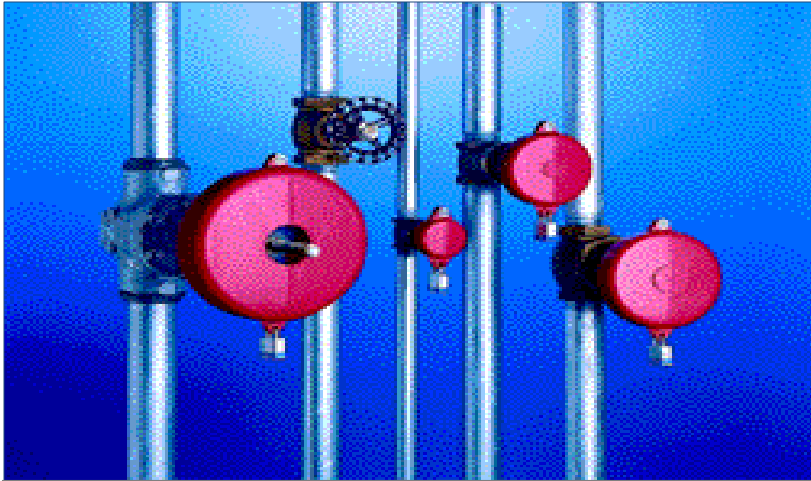
# Materials and Hardware

- Durable
- Standardized
- Substantial
- Identifiable



**1910.147(c)(5)**

# Types of Devices



Is this identifiable?





# Locks

- ❑ Locks shall be used if it is feasible.  
(There are a number lock out accessories now available suitable for locking out older equipment not originally designed to take a lock)
- ❑ Where applicable a facility's Operations' group should have individually keyed and numbered lock sets.
- ❑ Each authorized employee/contractor required to perform LO/TO should be issued with their own lockout lock(s) and key(s).
- ❑ Lockout locks should only to be used for LO/TO purposes.



# Locks

- ❑ One key per lock is ideal. If a second key is available, it should be under strict control.
- ❑ Only individual keyed locks are to be used, combination locks cannot be used.
- ❑ Locks that are used for Lock-out and Tag-out can not be used for any other purposes.
- ❑ A number of accessories are now available for locking out of equipment including those not originally designed to take a lock.
- ❑ Always use a six hold HASP to install the lock, and the last hole on the HASP to apply another HASP.





# Locks (continued)

- ❑ The Facility's Maintenance and or Contractor employee required to perform LOTO shall be issued with their own personnel lock.
- ❑ The LOTO keys of the facility's Maintenance and or Contractors locks shall be retained by the lock's owner.



# Tags Used For LOTO

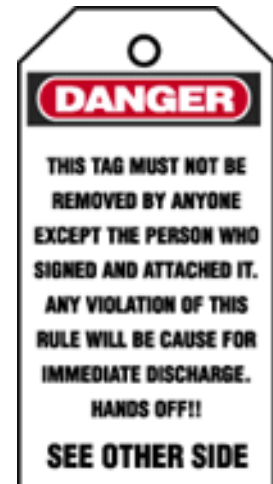


- ❑ LOTO Tags are generally to be utilised in tandem with locks.
- ❑ “Danger Do Not Operate” tags to be installed on any vents and or drains that are left open to atmosphere.
- ❑ Remember that tags only provide information and warnings to alert workers;

**IMPORTANT - TAGS DO NOT LOCK OUT AN ENERGY SOURCE!**

# Tags (cont'd)

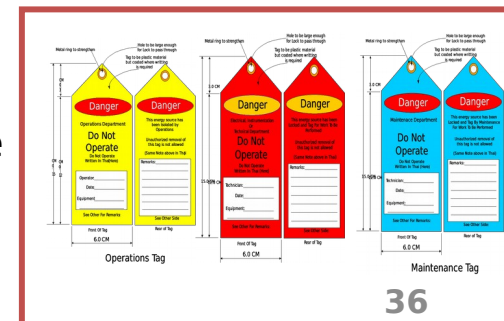
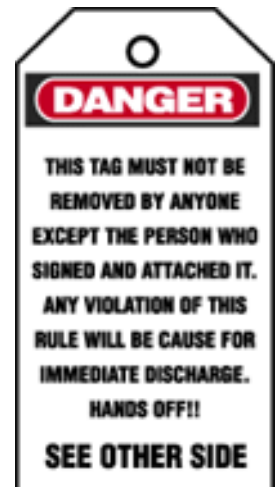
- ❑ Tags shall provide warning to personnel not to energize the equipment.
- ❑ Tags should be of a suitably durable material for the work environment in which they are installed.
- ❑ Tag must securely fastened to prevent accidental removal using a sufficiently strong self-locking, non-reusable tie wrap.



# Tags (cont'd)

## Design of Tags:

- ❑ Tags are to be standard across facility and different in design from other types of tags used for other purposes.
- Tags must be made of a suitable weather proof & when applicable heat resistant material.
- Tags should be written in a language understood by the workforce or may be bilingual.
- Tags should be filled out using a permanent marker.
- Must identify who put the tag, the date installed, the equipment isolated and the reason it is being isolated.
- Tags may be color coded to identify the discipline installing it. (e.g. Yellow Operations, blue Maintenance and red Electrical or Instrument Technicians)

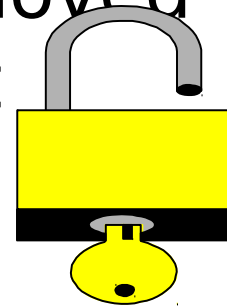


# Remember

- ❑ Locks and tags do not isolate energy sources – **People Do** using the locks & tags.
- ❑ Do not rely on another person's lock and/or tag – they may remove it without your knowledge, ensure your own lock and tag is installed on the six hole hasp.
- ❑ Locks and tags should only be removed by the person who installed them.
- ❑ LOTO is a control measure that is required as a part of the work permitting process – it should not be seen as superseding the need for a Work Permit.

# Notification of Employees

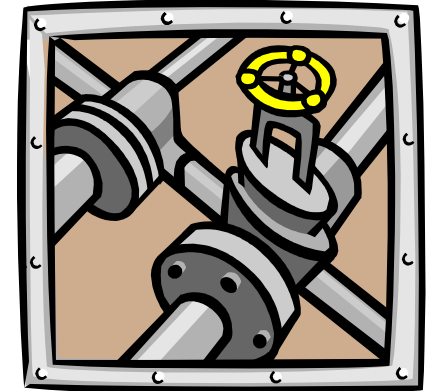
- ***Affected employees*** shall be notified by the employer or authorized employee of the application and removal of LOTO devices
- Notification given ***before*** controls are applied, and ***after*** they are removed from the machine or equipment



# Application of Control

Sequence for lockout/tagout procedures

- Preparation for shutdown
- Machine or equipment shutdown
- Machine or equipment isolation
- LOTO device application
- Release of stored energy
- Verification of isolation
- Release from LOTO
- Inspection of machine or equipment work area
- Location of employees

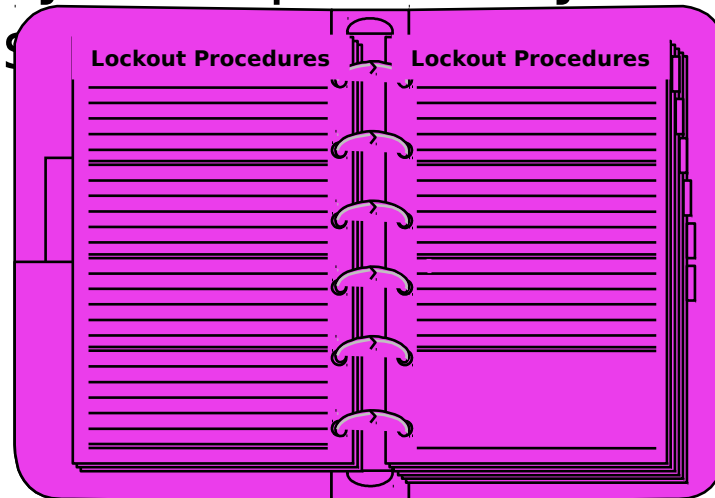


**1910.147(d)**

# Energy Control Procedure

## Procedures

- Shall be developed, documented and utilized for the control of potentially hazardous energy
- Shall clearly and specifically outline techniques for control hazardous energy



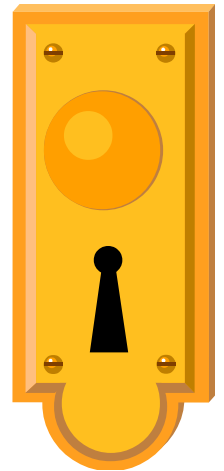


# Preparation for Shutdown

- Know the types and amounts of energy that it powers
- Know the hazards of the energy to be controlled
- Know method or means to control energy



Microsoft Word  
Document



**1910.147(d)(1)**

# Machine/Equipment Shutdown

- Turn off or shut down using established procedures
- Orderly shutdown to avoid additional or increased hazard(s) to employees as a result of the equipment stoppage



**1910.147(d)(2)**

# Energy Isolation

Lockout or tagout shall be performed only by the ***authorized employees*** who are performing the servicing or maintenance.



**§1910.147(c)(8)**

# Machine/Equipment Isolation

- All energy isolating devices needed to control energy shall be physically located to isolate the machine or equipment from the energy source(s)



**1910.147(d)(3)**

# **Lockout/Tagout Application**

- Shall be affixed to each energy isolating device by authorized employees
- **Lockout devices**
  - Shall be affixed in a manner that will hold the energy isolating devices in a "safe" or "off" position
- **Tagout devices**
  - Shall be affixed in a manner indicating that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited

**1910.147(d)(4)**

# Application of Devices

- Use valve covers, plug locks, etc. if the lock can't be placed directly on the energy control.
- When LO is used, every employee in the work crew must attach their personal lock.



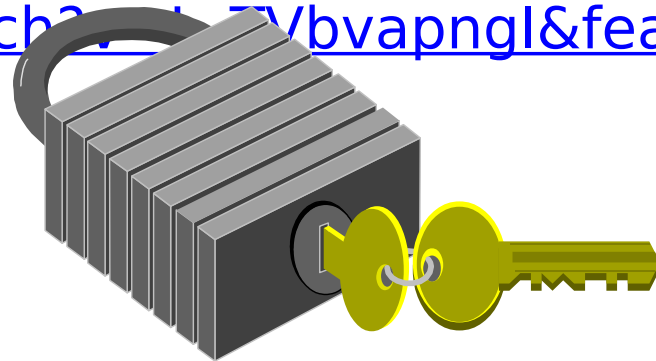




# Stored Energy

After application of device, all potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, and otherwise rendered safe.

<http://www.youtube.com/watch?v=7Vbvapngl&feature=related>



<http://www.youtube.com/watch?v=NIC3b1CCnXE&feature=related>

**1910.147(d)(5)**



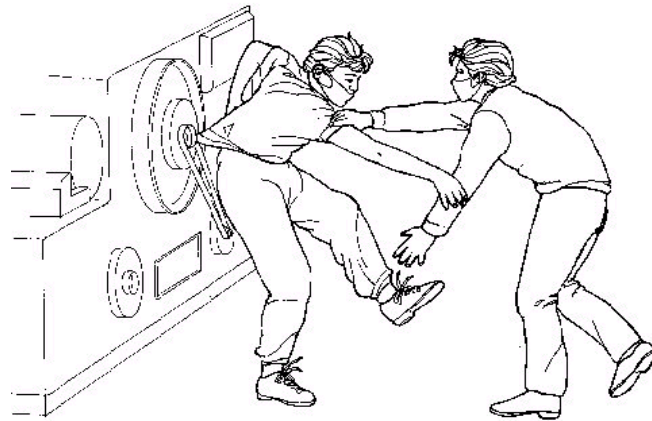




# Verification of Isolation

Prior to starting work on machines or equipment that have been locked out/tagged out

- Authorized employee shall verify that isolation and de-energization of the machine or equipment have been accomplished



**1910.147(d)(6)**

# **Release from Lockout/Tagout**

Before LOTO devices are removed and energy restored

- Work area inspected to ensure that nonessential items have been removed and to ensure that machine or equipment components are operationally intact
- Work area shall be checked to ensure that all employees have been safely positioned or removed
- Affected employees notified that LOTO devices are removed

**1910.147(e)**

# LOTO Devices Removal

Each LOTO device shall be removed from each energy isolating device by the employee who applied the device.

- **Exception:** When authorized employee who applied the LOTO device is not available, device may be removed under the direction of the employer.



**1910.147(e)(3)**

# LOTO Devices Removal

## Employer removal of LOTO device

- Specific procedure shall include:
  - Verification by employer that authorized employee who applied device is not at the facility
  - Making all reasonable efforts to contact authorized employee to inform them that LOTO device has been removed, **and**
  - Ensuring that authorized employee has this knowledge before they resume work at facility

**1910.147(e)(3)**

# Testing or Positioning of Machines

When LOTO devices must temporarily be removed for testing/positioning:

- Clear machine or equipment of tools and materials
- Remove employees from area
- Remove lockout/tagout device
- Energize and proceed with testing or positioning
- Deenergize and reapply energy control measures



**1910.147(f)**

# Outside Personnel

- Contractors and the on-site employer must exchange lockout/tagout information
- On-site employees must understand and comply with rules used by the contractor



**1910.147(f)(2)**



# Group Lockout/Tagout

When servicing and/or maintenance is performed by a group, they shall utilize a procedure which affords employee protection equivalent to a personal LOTO device.



**1910.147(f)(3)**

# **Group Lockout/Tagout**

- Primary responsibility is vested in an authorized employee.
- Authorized employee must ascertain exposure status of group members.
- If more than one crew is involved, a coordinator shall be designated.
- Each authorized employee shall use a personal LOTO device and remove device when they stop working on machine/equipment.

**1910.147(f)(3)**

# Shift/Personnel Changes

Specific procedures used during shift/personnel changes to ensure the continuity of LOTO protection

- To minimize exposures from the unexpected energization or start-up of the machine/equipment, or release



**1910.147(f)(4)**

# Sample LOTO Program

## Typical minimal lockout procedures

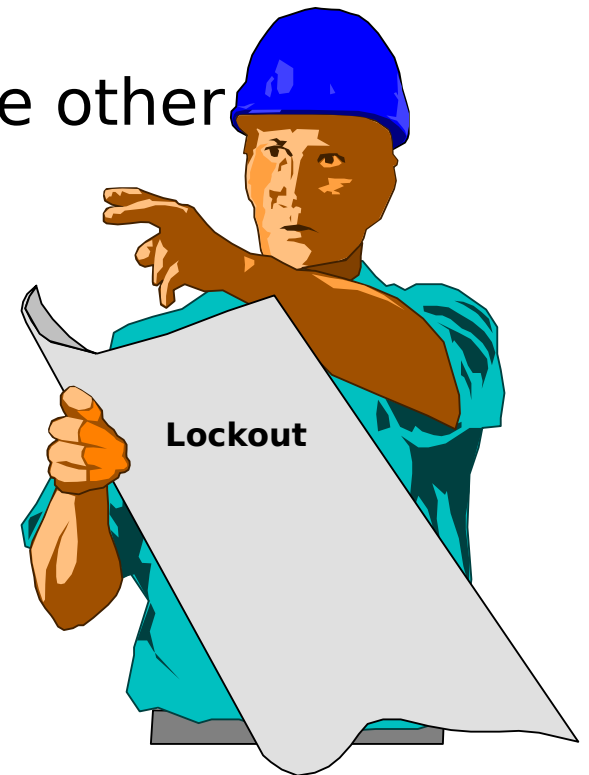
- A non-mandatory guideline to assist employers and employees in complying with the requirements of this section

LOCKOUT/TAGOUT PROCEDURE		Page 1
Organization:	Facility:	Date:
		Location:
<b>SCOPE:</b> This procedure covers the necessary safety precautions and procedures for servicing and maintenance of machines and equipment in which the unexpected energization or start up, or release of stored energy could cause injury to employees.		
<b>PURPOSE:</b> This procedure covers the minimum requirements for lockout and/or tagout of energy isolating devices to protect employees from hazardous energy including electrical, mechanical hydraulic, pneumatic, or other energy. It will be used as a facility wide general procedure for isolating all potentially hazardous energy (lockout/tagout) before employees perform any servicing and maintenance activities where unexpected energization, start up or release of stored energy could cause injury. This procedure, when used in conjunction with the specific information recorded on the attached pages of this procedure, provides the necessary information for lockout/tagout.		
<b>PROCEDURE:</b> <ol style="list-style-type: none"><li>1. Only trained, authorized employees can lockout/tagout.</li><li>2. All affected and other employees working in or entering work areas where lockout/tagout is performed must be trained.</li><li>3. Determine all energy isolating devices requiring lockout/tagout to ensure effective control of hazardous energy.</li><li>4. Determine the type and magnitude of the energy and required controls.</li><li>5. Notify all affected employees of the plans to lockout/tagout.</li><li>6. Shutdown the equipment/process by normal procedures.</li><li>7. Locate the necessary energy isolating device(s) to equipment/process and operate them to isolate energy sources and affix lockout/tagout devices.</li><li>8. Remove all stored or residual energy and take appropriate measures to ensure it does not reaccumulate. Affix lockout/tagout device as necessary.</li><li>9. Verify energy isolation and relief of stored energy after ensuring employees are not exposed and before beginning work. After start buttons are actuated, press the stop button.</li><li>10. Perform the servicing and maintenance.</li><li>11. To safely restore machine, equipment or process to normal production operations, replace all guards and safety devices, remove all personnel, restore all tools and equipment.</li><li>12. Notify affected employees.</li><li>13. Remove lockout/tagout devices (by authorized employee installing lockout/tagout devices).</li></ol>		
<b>LOCKOUT/TAGOUT DEVICE REMOVAL BY EMPLOYER:</b> When it becomes necessary to remove the lockout/tagout devices of an employee who is unavailable at the facility, it can be done only by the employer and then under a special, approved procedure, as follows:		
<b>GROUP LOCKOUT/TAGOUT:</b> When a lockout/tagout job involves numerous lockout/tagout devices and many employees, a group lockout/tagout procedure may be used. A separate, special written procedure or permit is required.		
<b>CONTRACTORS:</b> All contractors must comply with the lockout/tagout procedure specified by the site employer and employees of the employer must not violate the contractors lockout/tagout.		
Procedure Prepared By:	Date:	Procedure Authorized By: Date:

## Appendix

# Periodic Inspection

- Conducted at least annually to ensure procedure and requirements are followed
- Performed by authorized employee other than the one(s) using the procedure
- Designed to correct identified deficiencies or inadequacies



**1910.147(c)(6)**

# Periodic Inspection

- Employer shall certify that periodic inspection has been performed.
- **Lockout inspection**
  - Must review each *authorized* employee's responsibilities under the energy control procedure
- **Tagout inspection**
  - Must review each *authorized and affected* employee's responsibilities under the energy control procedure, **and**
  - Additional training requirements of 1910.147(c)(7)(ii)

**1910.147(c)(6)**

# **Training and Communication**

## **Authorized employee**

- Recognition of hazardous energy sources
- Type and magnitude of energy in workplace
- Methods and means for energy isolation and control

**1910.147(c)(7)**

# Training and Communication

## Affected employee

- Purpose and use of the energy control procedure



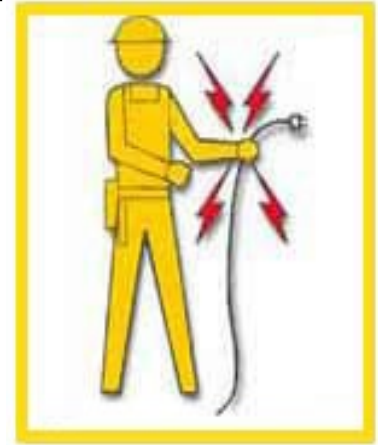
**1910.147(c)(7)**



# Training and Communication

## All other employees

- Procedures for lockout & tagout
- Prohibition of restarting or reenergizing machines that are locked or tagged out



**1910.147(c)(7)**

# Training and Communication

## Tagout systems

- Warning devices only; does not provide physical restraint
- Must not be removed/bypassed/ignored
- Must be legible and understandable
- Must withstand environmental conditions
- May evoke false sense of security
- Must be securely attached

**1910.147(c)(7)(ii)**



# **Training and Communication**

- Retraining for authorized and affected employees
  - Change in job assignments
  - Change in machines, equipment or processes that present new hazards
  - Change in energy control procedures
  - Whenever periodic inspections reveal, or employer has reason to believe, there are deviations in employee knowledge or use of procedures

**1910.147(c)(7)**

**Is this correct?**





# Common Deficiencies in LOTO Programs

- ❑ Keys left in locks
- ❑ One lock protecting multiple users
- ❑ Procedures not clear and concise
- ❑ No verification-1910.147(d)(6)
- ❑ Wrong type meter used for tryout
- ❑ Poor communication when removing locks
- ❑ No annual audits for each individual
- ❑ NFPA-70E Compliance / Training

# Key Left in Lock/One Lock For Multiple Users



# Clear and Concise Procedures

Lockout-Tagout Posted Procedure		
LOCKOUT=PRO™ 3.0		
ID#: SAP110201	Facility: PB Topicals Line 36	Location: Line 36 Alloy Machine
Created: 7/22/2008	Description: Lock Out Tag Out Try Out - LOTOTO	
2	Lockout Points	Note: This equipment is fed from electrical panel PKP-36 circuit breaker 1,3,5.
<b>Lockout Application Process</b> 1. Notify affected personnel. 2. Properly shut down machine. 3. Isolate all energy sources. 4. Apply lockout devices, locks, & tags. 5. Verify total de-energization of all sources.		
Lockout Steps		
Step #	Action	Info
1 ⚡ Electrical Primary Feed	The primary electrical disconnect is located on the side of the Alloyd machine at the main control cabinet. LOTO here for cleaning, servicing, mechanical or electrical maintenance or service. LOTO at electrical panel PKP-36 circuit breaker 1,3,5 if working inside the control cabinet. Turn Disconnect to the off position and lock out. Use a Lock, hasp, and tag device.	
2 ⌚ Pneumatic Primary Feed	The primary pneumatic ball Valve is located on the back side of the Alloyd machine at the base of the stainless steel utility chase. LOTO here and verify 0-PSI before performing maintenance or servicing the machine. Turn Valve to the off position and lock out. Use a Ball valve lockout, tag, and hasp device.	
<b>Lockout Removal Process</b> 1. Ensure all tools and items have been removed. 2. Confirm that all employees are safely located. 3. Verify that controls are in neutral. 4. Remove lockout devices and reenergize machine. 5. Notify affected employees that servicing is completed.		



# No Testing/Verification

- **OSHA1910.147(d)**  
**(6)**
- *“Prior to starting work, the employee must verify isolation and de-energization of equipment.”*
- Did the operator perform tryout?
- Can the disconnect switch be turned on?
- Is training adequate?
- TMI- Too Much Info. ?

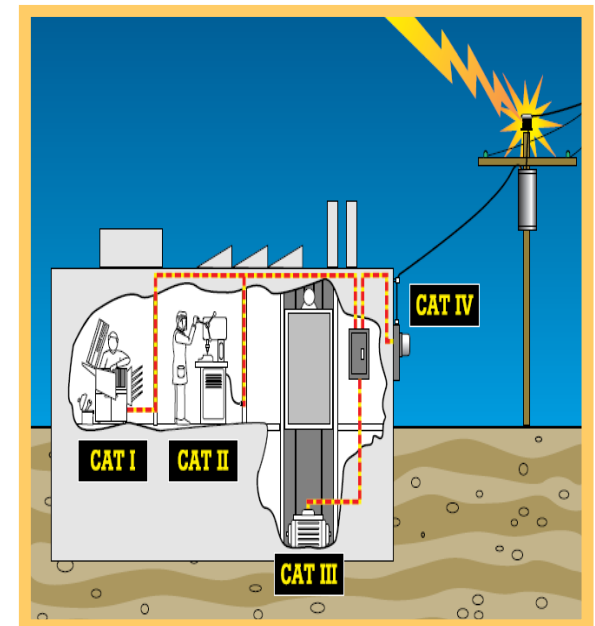




# Choose The Proper Meter

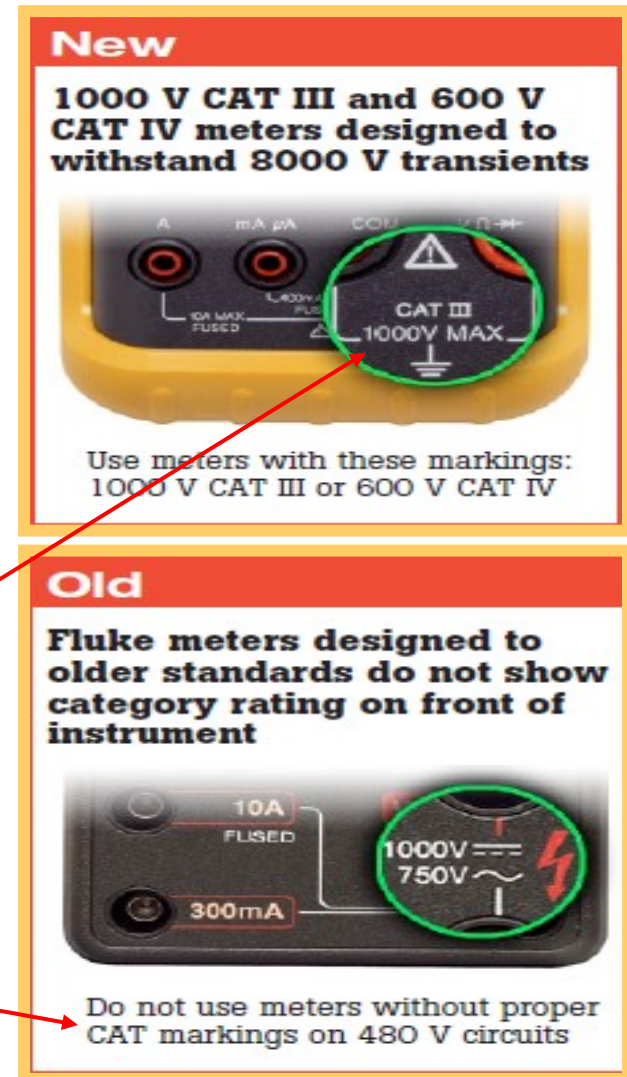
OSHA-1910.334(c)(3) – “Test instruments and equipment and their accessories shall be rated for the circuits and equipment to which they will be connected and shall be designed for the environment in which they will be used.”

- Understand the 4 categories
- Know how to use and care for the meter
- Take advantage of free training



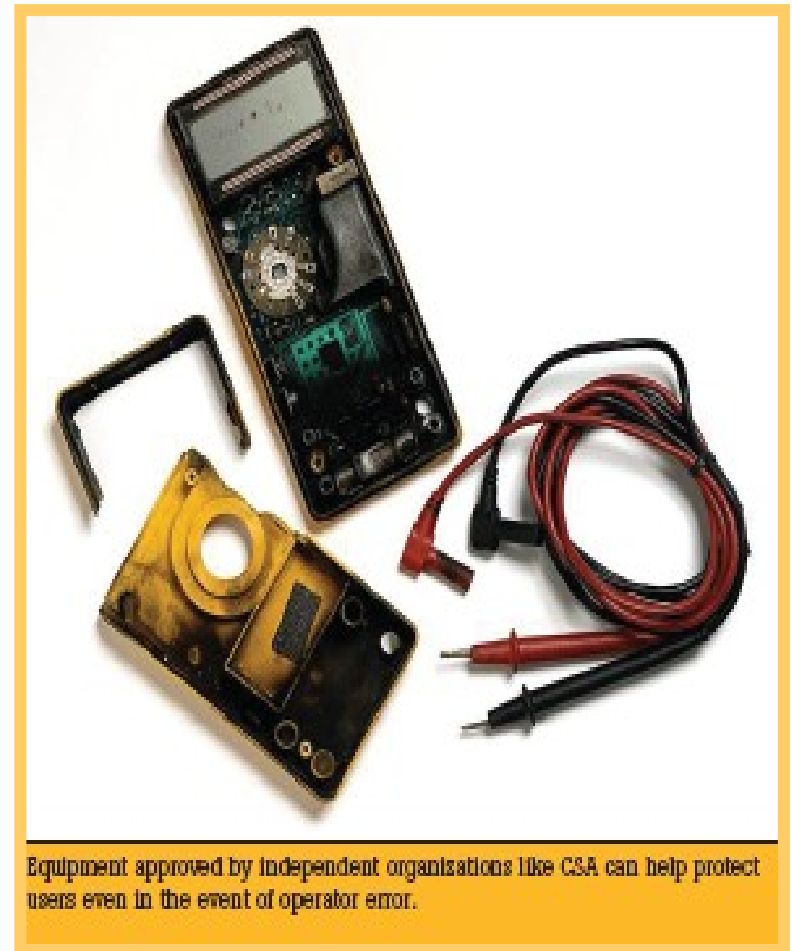
# Choose The Proper Meter (cont.)

- Ensure the meter has the proper voltage rating for the circuit being tested.
- Ensure the meter is set on the correct settings.
- Ensure the meter has the proper category rating for the circuit being tested.



# Choose The Proper Meter (cont.)

- Ensure meter is approved by a recognized testing lab.
- Change meter fuses only with exact replacements.
- Avoid holding the meter while testing, it could become a hand grenade!
- Wear proper PPE when using a meter, it is an extension of you.



# Choose The Proper Meter

## Not reliable for “LOTO”

- **Not effective if:**
- The insulated test point touches grounded metal.
- The cable being tested is partially buried.
- The user is isolated from ground.
- The tester used inside a metal enclosure.
- Voltage range may not be <90volts



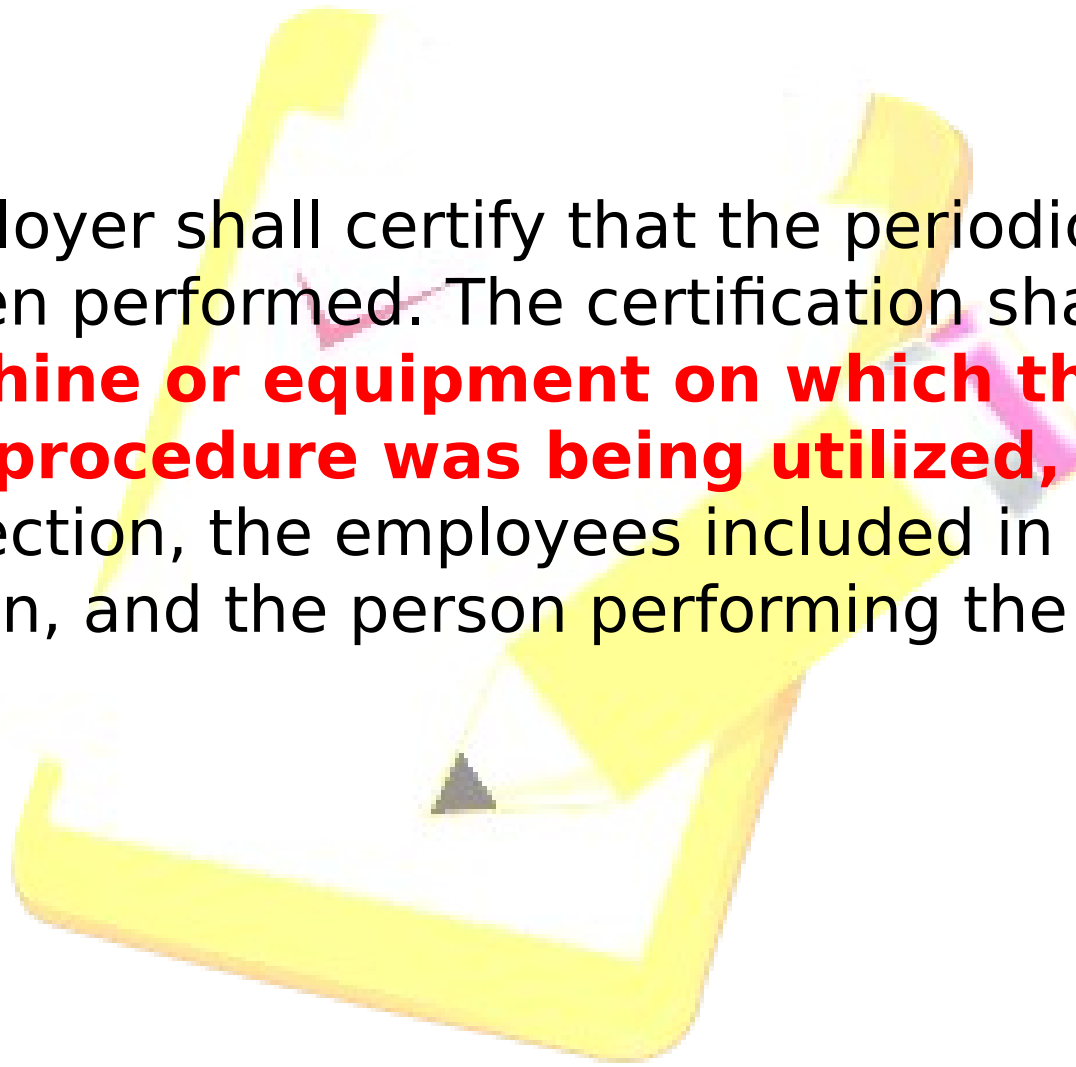
# Poor Communication

- **OSHA-1910.147(e)(3)exception-***“Procedures for LOTO removal when authorized employee is not available to remove their devices”.*
- **We were in compliance up to:** *“Ensuring the authorized employee has knowledge of their LOTO removal before resuming work at the facility.”*

# Annual Training

- ❑ The employer must provide training that will allow each authorized employee to understand the purpose and function of the employer's energy control program.
- ❑ And will allow each authorized employee to develop the skills and knowledge necessary to safely apply, use, and remove his/her lockout or tagout device (or its equivalent) and take other necessary steps so as to effectively isolate hazardous energy in **every situation** in which he/she performs servicing or maintenance activities.

# Annual Audit



The employer shall certify that the periodic inspections have been performed. The certification shall identify the **machine or equipment on which the energy control procedure was being utilized**, the date of the inspection, the employees included in the inspection, and the person performing the inspection.

# NFPA-70E Compliance

- Arc flash training- identifying qualified personnel
- Arc flash hazard labeling
- Purchasing protective clothing, insulated tools, and rated test-equipment
- Understanding arc flash boundaries: "arc flash, limited, restricted, prohibited"
- Understanding the procedure for establishing an electrically safe work condition and incorporating into contractor management program



# LOTO - Additional Information

- For further information and or instructions for the lock-out & tag-out system please refer to:
  - OPNAVINST 5100.23G Chapter 24
  - 29 CFR 1910.147
  - OSHA 3120 (2002 revised) Control of Hazardous Energy Lockout/Tagout
  - Your activities general operating procedures/standards/guidelines covering LOTO



# Summary

In this course, we discussed:

- The need for energy control procedures
- Methods of lockout/tagout procedures
- Employer's responsibilities
- Employee training needs
- Inspection requirements



**Thank You For Attending!**

Final Questions?